Office of Oversight
Environment, Safety and Health

Focused Review of the

Savannah River Site

November 1999

Integrated Safety Management

Executive Summary

EVALUATION:	Office of Oversight Focused Review
SITE:	Savannah River Site
DATES:	July-August 1999

Scope

The U.S. Department of Energy (DOE) Office of Oversight, within the Office of Environment, Safety and Health, performed a focused safety management review at the Savannah River Site (SRS). During the review, the Office of Oversight examined work planning and control processes being applied to operational, maintenance, and construction activities at F-Canyon and at facilities involved in tritium activities, specifically 232-H, 233-H, and 234-H. The work planning and control processes were evaluated against the five core functions of integrated safety management (ISM). Line management's implementation of ISM was also examined. The facilities selected enabled the Office of Oversight to evaluate differing missions, functions, and life cycle stages. This focused review is a follow-up to the January 1996 safety management evaluation conducted by the Office of Oversight.

Results

SRS has a sustained record of establishing and implementing effective safety management systems and programs. Essential to this is the DOE Savannah River Operations Office's (SR) and the Westinghouse Savannah River Company's (WSRC) commitment to the ISM principles. As a result of these systems, programs, and level of commitment, the site has demonstrated effective performance in planning, controlling, and executing work. The site is also a recognized leader in developing initiatives to improve ISM within the Department.

SR has provided clear direction and expectations for ISM implementation to WSRC. WSRC has embraced these expectations through the development of an ISM strategic plan that serves as the framework for maintaining and enhancing ISM implementation. Senior WSRC management effectively monitors progress and provides direction for ISM implementation through an ISM Steering Committee.

SR has conducted sufficient oversight of WSRC programs and activities to evaluate progress in achieving DOE expectations in most areas. Accordingly, WSRC has developed effective management systems and safety programs. WSRC self-assessment programs are mature and support continuous improvement. These initiatives are complimented by strong sitewide corrective action and lessons-learned programs that facilitate timely resolution of issues and enable SRS to learn from the deficiencies at other sites.

This strong foundation and commitment established by the DOE and contractor line organization has been translated into effective and consistent work planning and control processes at F-Canyon and at the tritium facilities. At SRS, management systems and processes have been established to ensure that work is appropriately planned. At both F-Canyon and the tritium facilities, formal schedules, Plan-of-the-Day meetings, and work coordination meetings are used to effectively identify, prioritize, and coordinate planned and emerging work. Work planning activities usually involve line management; environment, safety, and health (ES&H); maintenance; and other appropriate support personnel. Pre-job "walkdowns" of job locations are comprehensive and ensure readiness to perform work.

Although weaknesses were identified in WSRC hazard analysis processes, SRS workers are competent and are involved in identifying work activity hazards. Workers are active participants in hazard screenings, job hazard

analyses, and facility radiological assessment teams. At the facility level, the site demonstrates a thorough hazard assessment program through such mechanisms as basis for interim operation (BIO) and unreviewed safety question determinations. Safety analyses for complex tasks are generally comprehensive. Processes for effective hazard controls are demonstrated through a strong commitment to maintaining facility conditions and an overall safety awareness and discipline. Confirmation of readiness is performed for all work; operational, maintenance, and construction activities are conducted effectively and safely.

WSRC effectively measures safety management performance through a structured and integrated program of self-assessments, internal independent assessments, performance measures, and other feedback systems. WSRC identifies, captures, and tracks to completion ES&H performance deficiencies and evaluates corrective action implementation. WSRC has a strong program for identifying deficiencies within and outside SRS that have applicability to site activities and communicating these lessons to the appropriate organizational entity.

While SR has developed a set of programs to evaluate WSRC progress in achieving DOE expectations, some of these programs are not fully effective in supporting rigorous line oversight of WSRC. For example, a consolidated database of significant issues is not available to SR to allow tracking and trending of sitewide performance. This limitation challenges SR to provide appropriate and timely line oversight and management direction to WSRC for resolution of these issues. In addition, some lack of discipline was noted in the conduct of SR management walk-throughs, technical assessments, and self-assessments.

At an institutional level, the mission date for nuclear material stabilization and storage (NMS&S) activities has been extended beyond 2006 without re-evaluating the need to update the BIO to a safety analysis report (SAR) compliant with DOE Order 5480.23. Notwithstanding recent improvements in hazards analysis processes, there is a lack of integration among such processes used at the site. The hazard analysis process for procedure development and resolution is not well documented and does not always involve participation of subject matter experts.

Weaknesses in the hazard analysis process can result in inconsistent application of controls for identified hazards. There was evidence that some hazard controls to maintain worker safety were established without involvement or approval of industrial hygiene and safety personnel. There is no requirement for professional-level radiological engineering support to review or participate in radiological work permit planning or in as low as reasonably achievable (ALARA) reviews. Among the projects and work activities reviewed, there were deficiencies in verifying that worker training requirements were current and sufficient to perform the assigned activity safely.

Most SRS work is performed safely; however, some activities were not being conducted in accordance with procedures. Procedure non-compliance has been a historical and continuing concern at SRS as evidenced by a number of documented event reports. The line organization has placed priority on resolving this weakness. While workers typically follow procedures for work execution, operational and maintenance events continue to indicate that deficiencies in adherence to procedures and work practices persist.

Conclusions

SRS has implemented an effective integrated safety management system (ISMS), resulting in improved work processes and sustained safety performance. The mature safety management programs and line management commitment to ISM implementation have been translated into consistent performance of work planning and control processes at the facility, operational, and activity level. Personnel at the facilities evaluated function as cohesive teams in executing operational, maintenance, and construction tasks. Planning and scheduling of work activities, performing work consistent with hazard controls, and incorporating lessons into improved performance are strengths at SRS.

SR and WSRC management are aware of the challenges to continued ISM improvements and are taking appropriate steps to address most of these. Efforts are needed to enhance the rigor and effectiveness of SR line oversight processes; the integration of hazard analysis processes; and the involvement of industrial hygiene, industrial safety, and radiological engineering personnel in work planning and control activities. Continued management vigilance should ensure adherence to implemented safety programs and procedures and further improve overall ISM implementation at the site.

OVERVIEW OF ISSUES

1. The implementation of SR contractor oversight programs is not fully effective and lacks systematic application. Deficiencies were identified in implementation of the technical assessment program, inadequate documentation of management walk-throughs, and inadequate self-assessments of the SR line oversight program.

2. The mission date of stabilization activities has been extended past 2006 without re-evaluating the need to upgrade NMS&S BIOs to DOE Order 5480.23 SARs. Approval of the current NMS&S BIOs was based on the mission ending in 2002.

3. Multiple deficiencies were identified in the implementation of WSRC hazard analysis processes. Examples include: deficiencies in industrial hygiene/industrial safety training, staffing, involvement in work activities, and procedure reviews; weaknesses in radiological engineering support for the work activities and in pre- and post-job ALARA reviews; and a lack of integration and linkage between various hazard analysis elements (e.g., work clearance permits, job hazard analyses, preliminary hazard analyses, and safety plans).

1.0 Introduction

The Office of Oversight conducted a focused safety management evaluation at the Savannah River Site.

The U.S. Department of Energy (DOE) Office of Oversight, within the Office of Environment, Safety and Health, conducted an independent oversight focused review of the Savannah River Site (SRS) from July 26 through August 6, 1999. A previous assessment conducted by the Office of Oversight in January 1996 indicated that safety management systems, programs, and processes were being established at SRS. Since then, the site has completed integrated safety management (ISM) implementation activities and verification of Phase I (review of system description) and Phase II (review of system implementation). Accordingly, the primary purposes of the review are to provide feedback to line management on the effectiveness of selected work planning and control systems that implement the five core functions of ISM and to conduct an overall assessment of ISM implementation. This focused review also examined some of the weaknesses identified during the January 1996 safety management evaluation and the progress in resolving these weaknesses.

SRS areas that were included in this review were the F-Canyon and Buildings 232-H, 233-H, and 234-H.

SRS areas that were included in this review included F-Canyon and the tritium facilities (Buildings 232-H, 233-H, and 234-H). F-Canyon uses chemical processing to stabilize various materials, including reactor targets and offsite-generated plutonium scrap and residues. The 232-H facility extracts tritium from irradiated reactor rods, and recycles and purifies tritium. The 233-H facility loads tritium into new and recycled nuclear weapon reservoirs, unloads tritium from returned weapon reservoirs, and recycles and purifies tritium. The 234-H facility provides weapon reservoir shipping and receiving functions (see site overview below.)

OVERVIEW OF SAVANNAH RIVER SITE

SITE: The Savannah River Site (SRS) is located on federally owned land and covers 198,344 acres (310 square miles). SRS is located approximately 25 miles southeast of Augusta, Georgia, in the state of South Carolina. It borders 27 miles of the Savannah River between western South Carolina and Georgia.

MISSION: SRS was originally constructed to produce the basic materials used in the fabrication of nuclear weapons, primarily tritium and plutonium-239. The mission was expanded to the production of other special radioactive isotopes to support research in nuclear medicine, space exploration, and commercial applications.

SITE MANAGEMENT: The Savannah River Operations Office (SR) is responsible for providing day-to-day direction and oversight of site contractors. There were 14,000 people working at SRS as of January 31, 1999, including operating contractors and subcontractor personnel. Of these, approximately 500 are SR employees. SR is supported by the Westinghouse Savannah River Company (WSRC), the integrating management contractor, which is responsible for the site's nuclear facility operations; the Savannah River Technology Center; environment, safety, safeguards and security, health, and quality assurance; and the site's administrative functions. WSRC has several team members, including Bechtel Savannah River Company, Inc., which provides environmental restoration, project management, engineering, and construction support; Babcock & Wilcox Savannah River Company, which provides disposition of excess facilities and associated equipment; and British Nuclear Fuels Limited Savannah River Corporation, which manages the solid waste program and operates the Consolidated Incinerator Facility, Effluent Treatment Facility, and Saltstone Facility.

The selection of F-Canyon and the tritium facilities allowed the Office of Oversight to evaluate the consistency of work planning and control processes.

The review included observations of work activities and operations, facility walk-throughs, interviews, document reviews, and examination of safety management program elements (conduct of operations, industrial safety/industrial hygiene, maintenance, and radiation protection). This review focused on those site organizations responsible for day-to-day operation of F-Canyon and the tritium facilities, specifically the Savannah River Operations Office (SR), Westinghouse Savannah River Company (WSRC), and selected WSRC subcontractors. Figure 1 provides a simplified version of the SR and WSRC organizational structures.

The selection of F-Canyon and the tritium facilities enabled the Office of Oversight to evaluate facilities with differing mission and functions, facilities at different stages in their life cycle, and facilities operated by different elements of the WSRC organization. This selection of facilities and discipline areas allowed evaluation of the consistency of work planning and control processes and provides a basis for the assessment of the effectiveness of application of the core functions and overall ISM implementation.

In addition to the January 1996 safety management evaluation, the Office of Oversight participated in two other evaluations at SRS. In April and May of 1995, the Office of Oversight conducted a Type A accident investigation at the site following a fatality involving a fall from a rappelling tower. In February and March of 1998, the Office of Oversight examined the site's emergency management program as part of a complex-wide assessment of emergency management programs (see summary of previous Oversight evaluations on page 7).

Aerial View of F-Canyon

Section 2 of this report includes an assessment of line management's implementation of ISM at SRS as well as an evaluation of ISM implementation as reflected in each of the five core functions. Section 3 provides opportunities for improvement. Issues resulting from this review are summarized in Appendix A. In addition, Appendix A lists issues from the 1996 safety management evaluation, summarizes SRS actions to address these issues, and provides the Office of Oversight's assessment of issue status and conclusions. Further details on the evaluation process and team composition are provided in Appendix B.

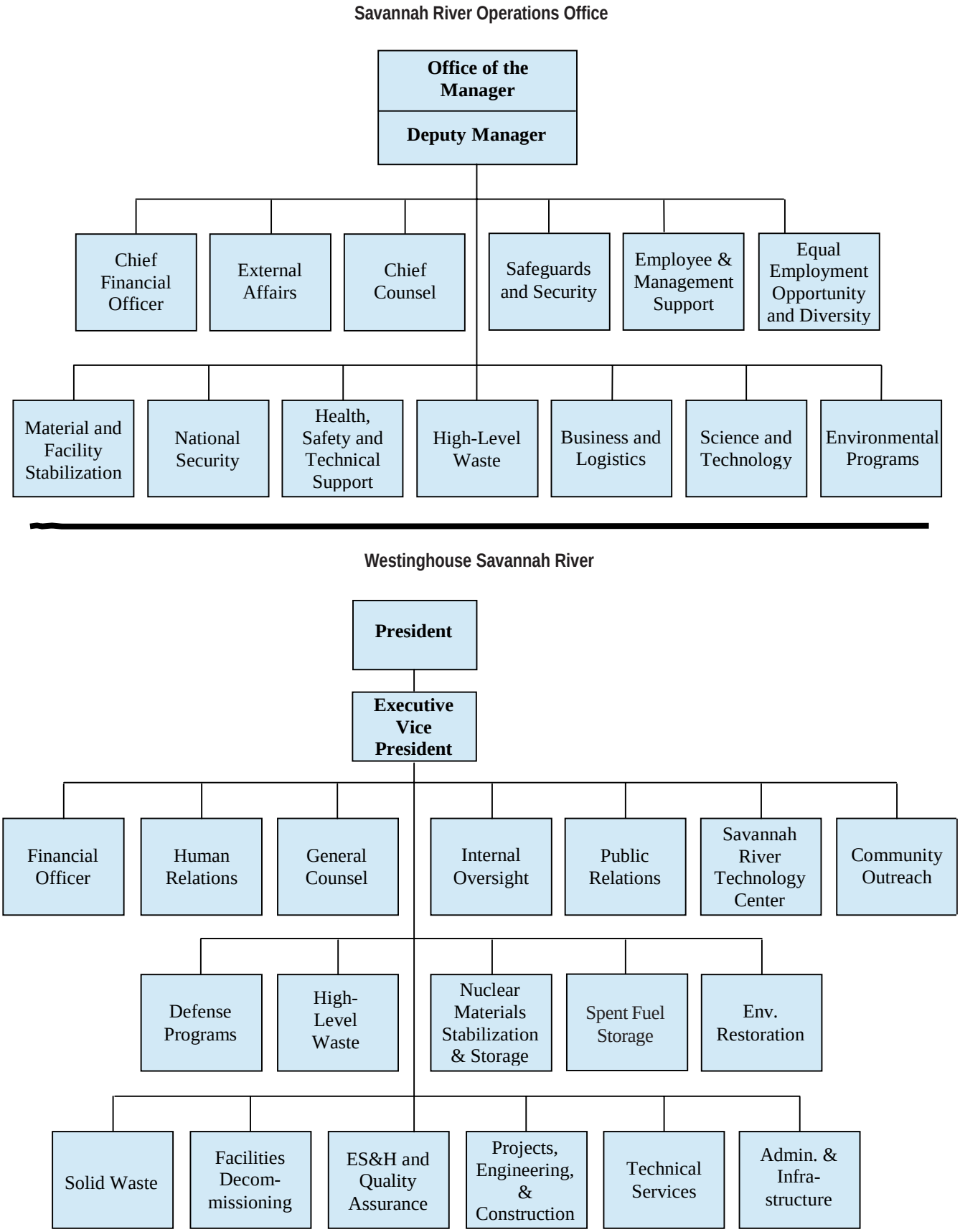


Figure 1. Simplified Organization Chart for SR and WSRC

SUMMARY OF RESULTS OF PREVIOUS OVERSIGHT EVALUATIONS AT SRS

Type A Accident Report on Rappelling Tower Accident, August 1995. A Wackenhut Services, Incorporated–Savannah River Site (WSI–SRS) Special Response Team member received fatal injuries from a 27-foot fall from the top of the SRS Advanced Tactical Training Academy security rappel tower. A buddy rappel, in which a rappeller carries a buddy on his back, was in progress, and a single rope was being used to descend from the top of the tower. The accident occurred when the rope separated during the rappel, and the rappeller fell on top of the buddy. The Accident Investigation Board determined that the direct cause of the accident was separation of the rope, which was caused by the rope coming in contact with the small-radius, sharp-edged, lock-pin housing of the newly installed safety gate combined with the dynamic load of the rappeller and the buddy on the rope. The Board found that there was confusion about the necessity of the Special Response Team's use of rappelling. The Site Safeguards and Security Plan did not include rappelling as a required Special Response Team operational or tactical response technique. The Board found that SR management did not ensure that the Special Response Team training requirements approved for the WSI–SRS mission were driven by the Site Safeguards and Security Plan. The Board also found that the DOE Headquarters Office of Nonproliferation and National Security exercised program management of the protective force and training programs in accordance with prevailing DOE orders. However, the Board determined that WSI–SRS viewed the rappel-training lesson plans from the DOE Office of Nonproliferation and National Security and the Central Training Academy as Department policy and, therefore, viewed the rappelling lesson plans as indicating that the DOE Office of Nonproliferation and National Security sanctioned rappelling, irrespective of site security requirements. In addition, the Board found that WSI–SRS and DOE policy regarding rappelling was inadequate to prohibit the use of the unacceptable buddy rappel technique.

Independent Oversight Evaluation of Environment, Safety and Health Programs at the Savannah River Site, January 1996. This evaluation found that safety management at SRS was effective and that sitewide operations were being performed in a manner that minimized risks to the safety and health of workers, the public, and the environment. In several areas, such as the standards/requirements identification documents (S/RID) approach to requirements management and the Facility Representative program, SRS was found to be leading the DOE complex. SRS developed strong top-level strategies, policies, and processes, which were well articulated and documented. SRS was facing challenges associated with changing mission, resource reduction, and implementation of evolving Headquarters policies (for example, privatization of DOE activities). SRS management and DOE Headquarters managers were found to be cognizant of the resulting uncertainties and were closely coordinating their efforts to meet these challenges. Weaknesses were identified during the evaluation in such areas as authorization basis documentation, recurring deficiencies, and root cause analysis, line oversight of subcontractor work, life safety code violations, and the integration of environment, safety, and health (ES&H) into laboratory operations.

Special Study of Emergency Management Programs at the Savannah River Site, March 1998. This review indicated that SRS had a sound and mature emergency management program. SR, WSRC, and WSI–SRS demonstrated a strong commitment to establishing and sustaining a well managed and responsive emergency management function, while balancing and controlling the impact of sitewide funding and staff reductions. SR and WSRC management commitment and program "ownership" were evident through their investment in state-of-the-art facilities and their attention to the provision and maintenance of essential emergency equipment. Commitment at the facility level was evidenced by a comprehensive training and drill program at the Defense Waste Processing Facility to ensure that operators are capable of responding to emergency situations. The SRS emergency management program was found to have a strong capability to self-identify deficiencies and to respond effectively to a wide range of emergencies. Notwithstanding the overall effectiveness of the emergency management systems, several weaknesses were noted. For example, the consequence assessment process did not ensure that decision-makers clearly understood the projected consequences so that they could implement appropriate protective actions. In addition, the upgraded classification of the annual emergency exercise, which required a response to a postulated explosion and potential offsite radiological release, was not conservative or timely because of differences in opinion among emergency response organization managers.

2.0 Results

Status of Integrated Safety Management Implementation

Implementation of ISM includes establishing, implementing, and maintaining processes to assure that appropriate consideration is given to Environment, Safety, and Health (ES&H) as part of the planning and accomplishment of all work.

Efforts to integrate safety into the planning and accomplishment of all work at SRS began well before integrated safety management was part of DOE policy and requirements. These efforts were evident when the Office of Oversight evaluated ES&H at the site in 1996. Since that time, the DOE contract with WSRC (contract number DE-AC09-96SR18500, hereafter referenced as the contract) has been revised to require implementation of the ISM objectives, guiding principles, and core functions of DOE Policy 450.4, issued in October 1996. WSRC developed a safety management system to be used at SRS for implementing ISM and submitted a description of this integrated safety management system (ISMS) to SR for approval in May 1997. The SR Manager approved the WSRC ISMS description in August 1997 following a Phase I verification review, which concluded that the ISM management systems met DOE guidance and requirements. Phase II reviews of ISM program implementation, conducted by DOE in October 1997 and June 1998, found that work was being accomplished safely but identified opportunities for improvement in the implementation of ISM. These opportunities for improvement have since been addressed by WSRC.

Positive Attributes

SR has provided clear and sufficient direction to WSRC for ISM implementation.

SR has provided clear and sufficient direction to WSRC for ISM implementation. A performance-based contract, containing appropriate clauses specified by Department of Energy Acquisition Regulations for ISM, has been established. A list of requirements applicable to WSRC has been documented in a standards/requirements identification document (S/RID) and incorporated into the contract. Each year, SR and WSRC reach agreement on the specific actions to be taken to meet the conditions of the contract, and WSRC commitments for these actions are documented in an Annual Operating Plan. The fiscal year 1999 Annual Operating Plan includes numerous commitments for improving safety performance and for assuring that appropriate consideration is given to ES&H as part of the planning and accomplishment of work across the site. Senior SR management maintains a focus on the status of implementation of these commitments through the SR Executive Technical Management Board.

SR has established comprehensive programs for oversight of contractor activities.

SR has established line oversight programs to ensure that DOE expectations are met by WSRC. Contractor performance is assessed through the Facility Representative and technical assessment programs. SR has maintained an effective Facility Representative program. Sufficient staffing, high levels of qualification, and management involvement have contributed to this success. A comprehensive technical assessment program has been developed to assess WSRC safety performance and compliance with S/RID requirements and to coordinate all SR technical assessments through an integrated plan to reduce duplication and assure that important areas are assessed. Provisions have been included in the contract for DOE to award fees to WSRC for good safety performance. Assessment results from the Facility Representative and technical assessment programs are used, in conjunction

Tritium Facilities

with other performance information, to determine fees based on established rating criteria. A July 1999 fee determination acknowledged improvements in ISM and a strong commitment to safety, but noted a need for improved safety performance in some areas.

WSRC has established and implemented effective programs for continuous improvement of ISM.

WSRC management understands that maintaining and improving an ISMS will require continuing management attention. In this regard, an ISMS Strategic Plan provides management direction for maintaining and enhancing ISMS implementation, and an ISM Steering Committee focuses senior management attention on ISM. The committee, which is chaired by the Executive Vice President and includes line vice presidents as members, meets monthly to review the status of ISM implementation and to provide direction to the staff. The committee has sponsored several important initiatives to enhance the effectiveness of ISM, including improvements in lockout/tagout processes, corrective action program improvements, and initiatives to improve ISM across the DOE complex (e.g., sponsoring a workshop on feedback and improvement in Atlanta in July 1999). Committee assignments are tracked through an Implementation Action Plan and are generally completed on schedule.

WSRC has developed and implemented effective programs, procedures, and training for the implementation of ISMS. WSRC directives and manuals are structured to provide a clear pathway for translating S/RID requirements to the activity level. Site-level manuals have been developed to address 20 functional areas of the site S/RID, and are readily available to employees through an Internet home page. Procedures and training are the mechanisms used to translate requirements from these manuals to the activity level. With a few exceptions, the translation of requirements from the S/RID to procedures was found to be accurate.

Self-assessment and lessons-learned programs have been effective.

WSRC management has demonstrated a strong commitment to self-assessment and corrective actions as mechanisms for improving safety performance. WSRC line organizations conduct an annual management self-assessment and briefs the ISM Executive Steering Committee on findings and planned corrective actions. A Facility Evaluation Board (FEB) performs thorough, candid independent assessments of safety performance and reports results directly to the President of WSRC. The WSRC programs for root cause analysis and for corrective actions were recently strengthened. The WSRC observed evolution and coaching tour programs are noteworthy practices that provide line management oversight and assistance to the tritium facility workers and promote significant management presence in the field. An effective lessons-learned program enables WSRC to learn from the mistakes of others and take steps to preclude similar occurrences at SRS.

SR and WSRC understand the value of working with other DOE sites and laboratories to address common challenges such as the implementation of ISM. They have assumed leadership roles for several ISM initiatives and have shared lessons learned in various forums across the complex.

Challenges

The Oversight team observed deficiencies in safe work practices.

SR and WSRC managers are aware of significant challenges to continued improvement in ISM and are taking appropriate steps to address these challenges. Most work is performed safely at SRS; however, some activities were observed not being conducted in accordance with procedures. For example, the Oversight team observed deficiencies in safe work

practices, such as exposure to an electric shock hazard, the absence of fall protection around an open excavation, and ladders not properly tied. Contractor self-assessments and SR line oversight are identifying similar deficiencies. WSRC is developing a "behavior safety program" to address continuing deficiencies in safe work practices and improve the safety culture of the SRS workforce. Other evolving initiatives to improve safety performance include efforts to better integrate existing safety programs with ISM and development of improved ISM performance measures. However, additional actions are needed to address several critical challenges.

SR oversight lacks discipline.

A lack of discipline was evident in the implementation of SR line oversight programs. SR established a management walk-through program to provide for direct management observation and assessment of contractor performance and to increase management presence in the field. Management walk-throughs are not tracked by all managers as required by procedure. Further, findings and observations from these walk-throughs are not consistently documented, which would increase the value of the walk-throughs. Additionally, individuals other than managers conduct some of the management walk-throughs.

Another line oversight program, the technical assessment program, is also not being consistently implemented in accordance with the applicable procedure. Programmatic assessments performed by line organizations under this program have been limited in scope, depth, and frequency. The F-Canyon maintenance program has not been reviewed in more than two years. Insufficient line management involvement and direction regarding scope, depth, and schedule of assessments contributes to the lack of discipline in the implementation of the technical assessment program. Individual assessors are given broad latitude to make decisions in these areas. Some lack of discipline is also evident in the Facility Representative program. Some Facility Representatives are performing fewer back-shift assessments than required by procedure.

SR has established a self-assessment program to determine if the SR staff is meeting applicable DOE Headquarters' directives. A 1997 Phase II verification review of the FB-Line found that this program was not effectively implemented, and SR managers acknowledge that implementation deficiencies continue. The program was described as unnecessarily burdensome, and a procedure revision is being developed to address this problem. An apparent cause of implementation deficiencies is insufficient resources to execute a program that was designed to be implemented when the SR staff was larger and contract support was greater.

ISSUE: The implementation of SR contractor oversight programs is not fully effective and lacks systematic application. Deficiencies were identified in implementation of the technical assessment program, inadequate documentation of management walk-throughs, and inadequate self-assessments of the SR line oversight program.

BIOs for NMS&S facilities have not been upgraded to SARs.

The 1996 Office of Oversight safety management evaluation indicated that SR and WSRC had not allocated the necessary resources to meet a commitment to upgrade the authorization basis for all facilities to DOE Order 5480.23 standards within five years. In addition, administrative, procedural, and technical problems were evident in the authorization basis and safety documentation. Since that time, the site has reported completion of several actions to address this issue.

Currently, authorization basis documents are in place to provide conditions and bases upon which SR has authorized WSRC to operate Nuclear Material Stabilization and Storage (NMS&S) and tritium facilities. Authorization basis documents for tritium facilities include a basis for interim operation (BIO) that is being upgraded to a more comprehensive safety analysis report (SAR) in accordance with DOE Order 5480.23. BIOs are also in effect for NMS&S facilities, but there are no plans to upgrade these documents to SARs. A 1996 cost-benefit analysis concluded that the cost of this upgrade was not justified, in part based on an assumption that the mission of these facilities would be completed in the year 2002. Although the current mission projections for nuclear materials processing activities at these facilities extend beyond 2006, a new cost-benefit analysis has not been performed to reassess the benefit of developing SARs for NMS&S facilities.

ISSUE: The mission date of stabilization activities has been extended past 2006 without re-evaluating the need to upgrade the NMS&S BIOs to DOE Order 5480.23 SARs. Approval of the current NMS&S BIOs was based on the mission ending in 2002.

WSRC safety professionals have not been sufficiently involved in work planning.

WSRC industrial hygiene/industrial safety professionals have not been sufficiently involved in procedure review, job planning, or job-site support. One cause of this insufficient involvement is the lack of clear and consistent thresholds in SRS work control processes for requesting and providing industrial hygiene/industrial safety support. Another possible cause is insufficient staffing in the areas of industrial hygiene and industrial safety. In 1998, in response to industrial hygiene performance deficiencies cited by SR, WSRC described plans to hire six additional industrial hygienists. Since that time, WSRC has had difficulty in hiring these individuals, and the level of staffing has remained unchanged. Training and qualification requirements for industrial safety and industrial hygiene professionals are not well defined given the responsibilities assigned to these individuals. Training and qualification of industrial hygiene and industrial safety professionals at SRS is particularly important in view of the wide range of hazards at this site and because most managers in these areas have limited training and experience in industrial hygiene/industrial safety.

The need for increased involvement of radiological engineers in work planning had been previously identified by SR and WSRC and was apparent to the Oversight team. WSRC has approved a Radiological Improvement Strategic Plan that includes provisions to improve the effectiveness of radiological engineering, but the tasks for implementation are not well defined, clearly assigned, or scheduled. Training and qualification requirements have not been established for radiological engineers, industrial safety, or other radiological professionals.

Summary

SR and WSRC managers have demonstrated a strong commitment to ES&H and to ISM. SR has provided clear direction to WSRC and has provided sufficient line oversight to assure that ISM is established and implemented consistent with DOE expectations. WSRC has developed and implemented effective programs, procedures, and training for ISMS implementation. WSRC understands that continuous management attention will be necessary to maintain and improve ISM performance and has established management systems to ensure this focus is sustained. SR and WSRC managers are aware of the significant challenges to continued improvements in ISM and are currently taking appropriate steps to address most of these challenges. Additional SR actions will be necessary to improve the implementation of SR oversight programs and to reassess the need for SARs for NMS&S facilities; additional WSRC actions will also be needed to address training, qualification, and staffing in industrial hygiene and radiological engineering.

Evaluation of the Core Functions

DOE Policy 450.4, *Safety Management System Policy*, defines the five core safety management functions that provide the necessary structure for any work activity that could affect the safety and health of the public, the workers, or the environment. The functions are applied as a continuous cycle, as shown in Figure 2, to systematically integrate safety into the management of work practices at the institutional, facility, project, and activity level. This review focused on work being performed at F-Canyon and at the tritium facilities (Buildings 232-H, 233-H, and 234-H). A range of operational, maintenance, and construction activities were examined at these facilities.

The site's mature safety management programs and commitment to ISM implementation have been translated into effective and consistent performance of work planning and control processes. The site generally performs work with full knowledge, awareness, and adherence to the core functions of ISM. Personnel at F-Canyon and the tritium facilities function as cohesive teams in performing operational, maintenance, and construction tasks. The integrating contractor and the site contractors are well organized into effective teams operating under consistent guidance across the site. Planning and scheduling of work activities, performing work consistent with hazard controls, and incorporating lessons into improved performance are strengths at SRS. Efforts are needed to enhance the rigor and effectiveness of

SR line oversight processes; the integration of hazard analysis processes; and the involvement of industrial hygiene, industrial safety, and radiological engineering personnel in work planning and control activities. The following sections summarize SRS's performance with respect to the five core functions.

Define the Scope of Work

Core Function #1: Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.

Effective processes have been established to plan, prioritize, and schedule work.

A well defined scope of work is critical to the success of an ISMS. It is the foundation of the budget formulation and allocation process and sets the stage for the rigor and depth of work-related hazard identification and analysis. An effective ISM process involves formal processes to ensure that work is accomplished according to expectations and incorporates multidisciplinary teams, up-front hazard analysis, and the development of controls to enhance the effectiveness of these processes. At F-Canyon and at the tritium facilities, a number of effective management systems and processes have been established to ensure that work is appropriately planned, prioritized, and scheduled.

For project construction work and modifications of structures, systems, and components, work is well defined and bounded by design change packages, project execution plans, project work packages, the work clearance permit (WCP), and work instructions. The scope of work for large projects, such as the F-Canyon exhaust upgrade project, is segmented into smaller, more manageable tasks to reduce the span of control and facilitate project execution.

An effective process has also been implemented for work of an operational nature. Regardless of scope and source of funding, most operations work at F-Canyon is initially defined and developed as a project. Major operational "campaigns" to process legacy materials are initially identified on the long-range planning schedule for NMS&S, and later transferred to the appropriate Annual Operating Plan. The

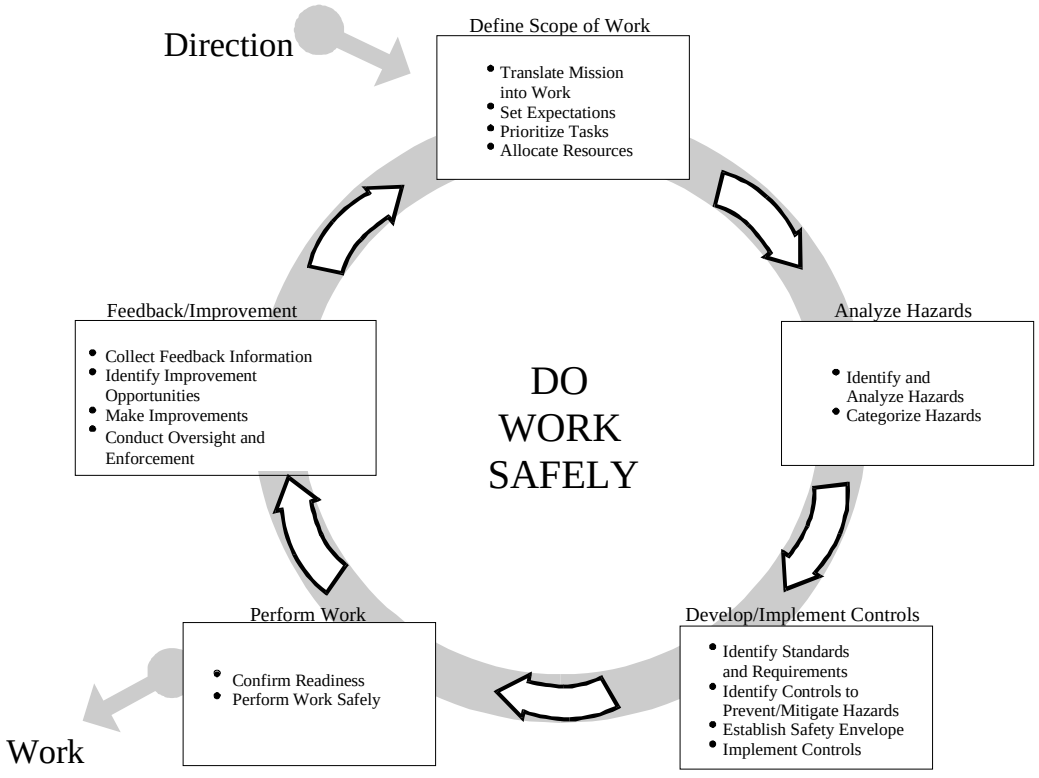


Figure 2. Core Functions of Integrated Safety Management

Overall View of F-Canyon Exhaust Upgrade Project

campaigns are conducted sequentially, based on relative material risk and other considerations such as facility capability and availability. For larger capital projects, the project scope is documented in facility design and system design documents. For example, the scope of the project to stabilize americium-curium solutions at F-Canyon is well defined in design documents. The major aspects of the project have been established on a schedule, and progress is being tracked and regularly reported to senior management. For campaigns of a lesser scope or duration, a responsible program leader uses division-specific engineering procedures to organize the campaign preparations into major functional tasks that include safety documentation and procedure development, facility equipment modifications, and operator training. These tasks are further divided into specific aspects for scheduling, resource assignment, and tracking purposes.

With few exceptions, work packages and technical procedures clearly define work to be performed.

With few exceptions, work packages and technical procedures clearly define the scope, boundaries, prerequisites, and initial conditions for work activities. The process for developing maintenance work packages at F-Canyon and the tritium facilities is described in the site's new work control procedure, which was piloted at the tritium facilities and subsequently adopted at F-Canyon. These facilities use dedicated work planners to define and document the work scopes in accordance with this procedure and develop the necessary instructions to safely accomplish the work.

The site work control procedure has a number of positive features, including work planning checklists and prerequisites to check maintenance history for previously performed work. One weakness observed is that for non-routine work, the procedure provides no guidance regarding expectations for work planner walkdowns. A potential vulnerability observed in the procedure is that it allows workers on a task within a "Fix-It-Now" work scope (i.e., minor maintenance activity) to perform work without a work order in hand. Although neither the F-Canyon nor the tritium facilities' maintenance organizations currently permit "Fix-It-Now" work to proceed without a work package in hand, this provision could result in improper performance of work or in work being conducted outside of the authorized scope. As this procedure is being implemented sitewide, line management must remain vigilant to ensure that mechanics performing tasks considered to be routine and "skill-of-the-craft" are provided the appropriate level of direction.

Overall, maintenance work packages are complete.

Overall, maintenance work packages are complete, with adequate instructions and supporting documentation. Planners generally have past work experience as mechanics, and the work control procedure provides guidance on the level of detail to include in work instructions for major activities. For other maintenance activities, the work planning and control process uses the "Fix-It-Now" concept to permit a graded approach to work planning. With this approach, a maintenance task that meets specific criteria for a low-hazard, short-duration (i.e., "routine") job can be planned with a minimum of work instructions. For the work packages reviewed, the work instructions were sufficiently detailed for both major and minor work, and provide the information needed to safely accomplish a job. Although maintenance work packages are "usable" by the workers, some work instructions contain only limited guidance regarding safety requirements or do not reference specific sections of procedures as required by the work control procedure. In several packages reviewed at F-Canyon, the "Safety Requirements" section of the work instructions cited the safety manual without additional reference to specific requirements applicable to the work activity.

Pre-job walkdowns of work sites are routinely conducted by job planning teams to support work package development. The teams include appropriate personnel from maintenance (first-line supervisor and workers), planning/scheduling, and (with few exceptions) other support groups, including radiation control, engineering, and industrial safety. At F-Canyon, workers are typically involved during the job planning stage. At the tritium facilities, workers either participate in the pre-job walkdowns or walk down selected non-routine "ready-to-work" packages before their scheduled work date. These walkdowns give workers the opportunity to check the affected work to identify changes since planning that would invalidate the hazards screening. These walkdowns result in better definition of work, more effective work methods, higher quality work instructions, and more complete definition and verification of hazards associated with work activities.

Pre-job briefings are used effectively to ensure that workers understand the job scope prior to commencing work.

Pre-job briefings are used effectively to ensure that workers understand the job scope before they begin the work. Formal pre-job briefing checklists remind supervisors to review work scope during these briefings. While site procedures relevant to many jobs do not require a formal pre-job briefing, F-Canyon management requires work group supervisors to conduct informal pre-job briefings using a division-specific briefing checklist to ensure consistency across work groups.

In a few cases, the definition of work was inappropriate for conditions. For example, for a job involving calibration of a long-dormant instrument, the scope of work documented on the WCP did not indicate that the instrument was isolated and tagged. In addition, the hazard controls specified in some WCPs aren't broad enough to address the scope of the intended work. For example, the WCP for a tritium line break in Building 234-H included the radiography task although the work definition and controls in the WCP did not address radiography.

Work activities are effectively prioritized, scheduled, and coordinated to execute the facility missions. Emergent maintenance work is prioritized using formal criteria that consider personnel, facility, and environmental safety. Formal Plan-of-the-Day meetings are used to define daily project, maintenance, and operations work activities; to communicate work priorities to facility personnel; and to identify the resources necessary to conduct the activities. A near-term rolling schedule aligns resources with planned job requirements and facilitates the proper sequencing of activities. As a result, the scheduling process effectively controls the amount of work being accomplished using existing resources, allowing the facility to accomplish its missions while maintaining a safe work environment.

In support of the scheduling process, work management center "work window" managers help define, schedule, and stage maintenance work. Although the work group supervisors are responsible for ensuring that work activities are executed as scheduled, the work window managers are tasked with ensuring that materials, tools, and equipment are staged or reserved for "ready-to-work" activities. They assist in work activity preparations and are responsible for timely resolution of potential and actual work activity interruptions. The effectiveness of the prioritization and scheduling processes is indicated by a declining corrective maintenance backlog at the tritium facilities, a relatively constant backlog at F-Canyon while simultaneously implementing a new work control system and transitioning to a new computerized maintenance management system, a greater-than-90 percent scheduled work completion rate, and the absence of a preventive maintenance backlog at both the tritium facilities and F-Canyon.

Summary

In general, project plans, work packages, and technical procedures clearly describe the scope and definition of proposed work activities. Work documents are complete and include adequate descriptions and supporting material. Work activities are effectively planned, prioritized, and scheduled, and institutionalized guidance documents promote a graded approach to work planning while still ensuring an acceptable level of consistency between facilities. Implementation deficiencies indicate that continued attention by managers, supervisors, and planners is needed to ensure that the appropriate level of detail is provided in the documents that define work.

Analyze the Hazards

Core Function #2: Hazards associated with the work are identified, analyzed, and categorized.

To conduct work safely, line management must ensure that structured processes exist and are implemented sitewide to identify and analyze work hazards consistent with the complexity of the work activity and the significance of the risks. The level of line management involvement in reviewing and approving hazard analyses should be commensurate with the complexity of the work and the hazards involved. At SRS, hazard identification, analysis, and categorization programs and procedures have been established at the institutional, project, facility, and activity levels. SRS workers are actively involved in identifying work activity hazards. However, there is a lack of integration among hazard analysis processes used at the site and a lack of full involvement of industrial hygiene and industrial safety personnel in work planning and hazard identification.

Hazard identification, analysis, and categorization programs and procedures have been established at all levels.

Procedures that describe the hazard analysis programs are documented in institutional-level manuals. Institutional-level procedures are routinely reviewed for consistency with S/RID requirements. These institutional hazard analysis procedures are kept current with S/RIDs and Federal requirements, are well written, and are usable.

Procedures and work packages associated with engineering design changes are appropriately evaluated using the USQD process.

The facility-level safety documentation (i.e., SARs and BIOs) at the tritium facilities and F-Canyon describes the facility hazards and is maintained in accordance with site policies and procedures. To ensure that the safety envelope established in BIOs and SARs is maintained, procedures and work packages associated with engineering design changes at both F-Canyon and the tritium facilities are appropriately evaluated using the unreviewed safety question determination (USQD) process. Some ES&H support groups also document facility hazards. For example, the industrial hygiene staff at both the tritium facilities and F-Canyon have prepared and maintain a baseline hazard analysis (BHA) document for identifying industrial hygiene-related hazards and controls as required by DOE Order 440.1A. BHAs, which are updated annually at each facility, are principally used by industrial hygienists. BHAs could provide useful information to work planners and first-line supervisors if the BHA information were furnished in a user-friendly format. The BHA is not well integrated with other hazard assessment documents (e.g., BIOs, preliminary hazard analyses or PHAs, job hazard analyses or JHAs). There are few mechanisms to promptly capture changes in facility hazards in the BHA. Recognizing this weakness, WSRC recently established a team to evaluate the effectiveness of the BHA process.

Workers are involved in identifying hazards during the work planning process.

At the work activity level, hazard identification and analysis processes are integral to the work activity being performed. Routine and non-routine maintenance and construction work activities are documented in work packages, in which the hazard identification and analysis is recorded in WCPs, JHAs, and a variety of permits for each hazard associated with the work activity (e.g., confined space and radiation). Workers are involved in identifying hazards during the work planning process. This involvement was evident for projects and construction at F-Canyon and the tritium facilities and for selected projects at H-Canyon. For example, electrical and instrumentation mechanics at F-Canyon were satisfied with their level of involvement in identification of hazards through job walkdowns, hazard screenings, and participation in JHAs. The JHA and facility radiological assessment teams processes and pre-job reviews at F-Canyon involve workers in hazard identification. Workers identified additional hazards (e.g., confined space and elevated platform tripping hazard) at pre-job walkdowns.

Through the encouragement of SRS management and the voluntary protection program process, WSRC has formalized the JHA process. Classroom and video

training on the JHA process has been conducted for more than 3,700 SRS employees. WSRC established an innovative concept of creating a sitewide JHA home page for sharing JHAs among facilities and divisions. To date, however, participation has been limited, and JHAs are not consistently used across the site.

Insufficient guidance and training have been provided for implementation of hazard analysis processes.

Although SRS has achieved significant progress in developing and implementing JHAs, the JHA process has not fully matured across SRS organizations. The current application of the JHA process can be an onerous task requiring significant resources and senior management approval, thereby inhibiting its routine use on smaller tasks for which the JHA may provide benefit. JHAs are not consistently performed across divisions. There are no consistent thresholds for when to perform a JHA, based on the magnitude of the hazard. For example, no JHA was required for a tritium line modification in 234-H, although that activity was non-routine and involved a number of potential hazards such as a confined space, welding, construction of a hut, radiography, breathing air systems, construction of an elevated platform, and special local ventilation. There is no clear guidance on the use of the JHA in conjunction with the WCP. Weaknesses were identified in a subcontractor PHA. Proposed revisions to the WSRC JHA procedure should address several of these concerns.

Presently, the WCP is not a fully effective hazard analysis tool, although the WCP is often used in this application. The WCP can be effective in documenting the results of a hazard analysis performed through a JHA, specifying the controls for hazards that were not abated by the JHA process, and in authorizing work. However, there are several problems with using the WCP as a hazard analysis tool. For example, not all common hazards are identified by check boxes in the WCP Hazards Screening section (e.g., noise, heat stress, ergonomic hazards, biohazards, rodents). Unlike the radiological work permit (RWP), the hazards and controls identified in the WCP are not linked with specific job tasks or work steps; this lack of linkage leads to some confusion for work activities with multiple work steps, hazards, and controls. Also, unlike the JHA, there is no mechanism for documenting or explaining special or synergistic hazards, identifying non-radiological training requirements, or linking training requirements with hazards on a WCP. The JHA, WCP, RWP, and other permits that identify hazards are not well integrated, which may lead to inconsistent and inappropriate controls for the specified hazards.

Some personnel who prepare WCP work scopes lack sufficient training or an understanding of when to involve the appropriate ES&H support disciplines in preparing WCPs and in reviewing work packages. For example, work planners at F-Canyon and the tritium facilities were not familiar with the existing criteria for involving industrial hygiene in WCPs, and no criteria exist for involving industrial safety in the review of either WCPs or work packages. In addition, the industrial hygiene guidance contained within the work control procedure for work package approvals is inconsistent with the guidance provided in the work clearance and authorization procedure. Work group supervisors and planners indicated that they would involve industrial hygiene and industrial safety personnel in the work scope definition process if there were any uncertainty regarding work scope (and potential hazards to workers). However, the absence of consistent, formalized thresholds can limit the recognition of potentially hazardous conditions during the work planning process.

The hazard analysis process for procedures is not well documented and has occasionally excluded the relevant subject matter experts.

Many project activities, some engineering activities, and operations are typically conducted using approved procedures. The hazard analysis process for procedure development is achieved by ensuring that the appropriate subject matter comment on the procedures. However, the procedure process review is not well documented and occasionally excludes the relevant subject matter experts. Some procedures at F-Canyon failed to include industrial hygiene reviews for hazardous chemical procedures (e.g., nitric acid transfers). Some procedures at the tritium facilities failed to include safety engineering reviews for material handling equipment (hoists and motorized pallet lifts). Although guidance is provided for ES&H involvement in procedure reviews, such guidance is limited and varies among divisions. The Conduct of

Operations Manual provides no guidance or criteria for ES&H review. The tritium facilities developed a DeskTop Guide that provides guidance to procedure writers for involving ES&H disciplines in the procedure review process. However, the guide has not been revised since 1995, and there is a lack of rigor in following the guidance. Although NMS&S has developed a procedure matrix identifying procedures that require ES&H involvement, it is new and will not apply to existing procedures until the next revision cycle. The application of the JHA process to procedures is not mature, although clear JHA criteria have been recently incorporated into the NMS&S procedure review process.

For some work activities performed by subcontractors, the hazards are not adequately identified, analyzed, or documented. For example, the subcontractor safety plan and the hazard analysis at the H-Area storm water upgrade project failed to identify a fall protection hazard associated with deeper excavations. Conversely, when WSRC participated with the subcontractor in preparing a JHA, such as at the cold water chiller replacement project at F-Canyon, the hazards and controls were adequately identified and analyzed.

Some work activities lack sufficient industrial hygiene and safety involvement.

Although ES&H disciplines are usually integrated into work activities, some work activities lack sufficient industrial hygiene and safety involvement to ensure that the hazards are adequately identified, analyzed, and documented. For example, although industrial hygiene reviewed the preliminary work package for a tritium line break work activity in 234-H several months before the work activity, they did not participate in pre-job briefings or job walkdowns just before the work activity began. Building management considered the job to be a significant non-routine activity that involved using breathing air systems, reclassifying a confined space (an industrial hygiene function according to the site safety manual), welding, constructing an elevated platform, and constructing a local ventilation system. Some new hazards (e.g., a confined space) were identified during the job walkdown and discussed during the pre-job briefings. Industrial hygiene evaluation of these hazards and permit authorizations was conducted by telephone, and the level of industrial hygiene authorization (i.e., technician) on the WCP was inappropriate.

ISSUE: Multiple deficiencies were identified in the implementation of WSRC hazard analysis processes. Examples include: deficiencies in industrial hygiene/industrial safety training, staffing, involvement in work activities, and procedure reviews; weaknesses in radiological engineering support for the work activities and in pre- and post-job ALARA reviews; and a lack of integration and linkage between various hazard analysis elements (e.g., WCPs, JHAs, PHAs, safety plans).

Summary

Hazard identification, analysis, and documentation processes have been established at the institutional, project, facility, and work activity level. Facility-level SARs and BIOs at the tritium facilities and F-Canyon adequately describe the facility hazards and are maintained in accordance with site policies and procedures. Although most work is currently analyzed, processes for identifying, analyzing, and documenting hazards at the work activity level are established but have not fully matured or been adequately integrated. The JHA process, which has achieved progress in its three-year history, is limited in its application, understanding, and acceptance. Consistent and appropriate involvement of ES&H personnel in work planning, procedure reviews, and work evolutions requires additional management attention.

Develop and Implement Hazard Controls

Core Function #3: Applicable safety standards and requirements are identified and agreed upon, controls to prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.

At SRS, most elements of hazard control were formal and comprehensive.

Hazard controls include engineering controls (e.g., buildings, enclosures, safety systems, ventilation systems, controls, and instrumentation), personal

protective equipment (e.g., protective clothing, respirators), and administrative measures (e.g., limits, safety requirements embedded in procedures, warning signs, training). The established levels of controls must be adequate to protect workers, the public, and the environment from all hazards associated with work activities. At SRS, most elements of hazard control are formal and comprehensive. Systems used to control and communicate operations at F-Canyon and the tritium facilities are formal, comprehensive, and effective. These systems included shift turnovers, Plan-of-the-Day meetings, and strong efforts to maintain facility condition, safety awareness, and discipline. However, there were some inconsistencies in the WCP process and weaknesses in the level of radiological engineering support and documentation of ALARA reviews.

Strong efforts to maintain facility condition and safety awareness and discipline were evident.

Strong efforts to maintain facility condition and safety awareness and discipline were evident throughout F-Canyon and the tritium facilities. Industrial safety and radiological housekeeping constitute a high priority item as evidenced by the orderly condition of work areas, including a lack of typical industrial deficiencies, neatly wrapped cords, emptied waste receptacles, good boundary integrity, and janitorial cleanliness. Aggressive efforts to manage the corrective maintenance backlog and eliminate delinquent preventive maintenance items contribute to effective facility hazard control. In general, radiological and industrial hygiene/industrial safety postings were clear, current, and readily evident in both facilities.

Site personnel displayed excellent awareness of safety and were knowledgeable of the importance of implementing effective hazard controls.

Personnel at all levels of the site displayed excellent awareness of safety and were knowledgeable of the hazards present and the importance of implementing effective controls. An example was in the area of potential heat stress resulting from the weather, which caused unusually high and prolonged temperatures and humidity, during the assessment period. Significant efforts by management, industrial hygiene and safety, and supervisors were effective at communicating the heat stress hazard. This was evidenced by emphasizing heat stress hazards and precautions at meetings, a heat stress fitness-for-duty questionnaire in pre-job briefing procedures, and frequent site public address announcements of heat stress conditions.

The chemical management process for meeting Environmental Protection Agency requirements at F-Canyon is well structured and managed. Essential chemicals (i.e., bulk storage and process chemicals) are inventoried on a monthly basis, and inventories are compared to chemical regulatory thresholds by the Environmental Coordinator. An annual inventory of all other chemicals is entered into the Chemical Information and Inventory System. Site-specific hazard communication (HazCom) is extensive, and training records indicated that workers were current on site-specific HazCom training.

The operational safety requirements for F-Canyon (a generic set applicable to all F separations areas) were last revised in 1996; however, many of the requirements are qualitative and are not written to the level of detail needed. For example, one Limiting Condition for Operation provides a list of required instrumentation, monitors, and controls, but does not specify any acceptance criteria to determine the minimum level of acceptability or operability. To compensate for these weaknesses, the facility uses a database to relate safety basis requirements with specific implementing documents. In addition, a procedure for operation and control of safety systems provides specific requirements for minimum operability and required actions for inoperable equipment. The current operational safety requirements are scheduled to be replaced with technical safety requirements that comply with DOE Order 5480.22 by July 2000. WSRC has recently submitted the first draft of the new technical safety requirements to SR for review and is currently developing an implementation plan. Sufficient resources appear available to complete technical safety requirement implementation.

At the activity level, hazard controls are developed in accordance with the site's work control process and coordinated at the Work Control Center in each facility. As discussed under Core Function #2, the primary mechanisms for defining and implementing hazard

Storm Water Upgrade Project

controls at the site are RWPs for radiological hazards, WCPs and JHAs for nonradiological hazards, and approved procedures. In general, activity-level hazard controls effectively provide an adequate level of protection against the hazards that exist during facility work evolutions.

Deficiencies in implementation of the WCP process were observed with respect to application of controls.

Some weaknesses in implementation of the WCP process were observed. The WCP does not provide a detailed mechanism for documenting task-specific hazards associated with the job, as the JHA and RWP do. Therefore, completing the WCP is confusing for jobs with multiple tasks and differing controls. For example, the WCP associated with the excavation at the storm water upgrade project identified fall protection as a hazard, but specific controls were not established to mitigate the hazard associated with falling into the excavation. In other cases, maintenance work orders had some inconsistencies in WCPs associated with identification of hazards and the corresponding controls. In a few instances, inconsistent controls were specified in WCPs for similar lamp replacement activities. One WCP required removal of all conductive apparel and another did not. Neither WCP identified the job as involving any electrical hazards or work on or near energized equipment. For a plugged sump indicator, no hazards were identified, although the job was checked as generating radioactive waste, and a line break was authorized by the WCP and work procedure.

The latest revision to the WCP procedure eliminated the signature block for radiological control review and approval. This change decreases the effectiveness related to integration of requirements between industrial hygiene and radiological control and the accountability for development of synergistic controls in these areas. For example, the WCP and RWP for the 234-H line break activity were inconsistent in their requirements for protective gloves for welding. As an added measure in F-Canyon, the work management center required radiological control approval of the WCP despite the procedural change.

Some weaknesses were identified in the level of required radiological engineering support for job planning.

At F-Canyon and the tritium facilities, the most significant radiological protection concerns are related to the potential for internal exposure and contamination control, due to the nature of the work and the predominant isotopes in these facilities. The site is very conservative regarding internal radiological protection, and there is significant reliance on respiratory protective devices for work that could generate airborne contamination. No problems were noted in the selection and implementation of such radiological controls. However, some weaknesses were identified in the level of required radiological engineering support for job planning and in the documentation and application of ALARA reviews.

At SRS, there are no procedural requirements or documented criteria governing the involvement of radiological engineering personnel in the work planning process. Jobs identified as requiring more radiological review than the RWP process receive an ALARA review; however, such reviews are performed by ALARA coordinators, not radiological engineers. ALARA coordinators have varying levels of training and experience in radiological protection. The facility radiological assistance teams also review some higher-hazard radiological jobs, but there is no requirement for a radiological engineer on the facility radiological assessment teams. The WSRC Health Physics Technology Group has professional radiological

engineers who can support job planning efforts, but only if specifically requested by line management for a specific work activity.

Technical justification and documentation of ALARA reviews need improvement.

Job-specific ALARA reviews are of limited scope and documentation. For the Lexan cover installation in F-Canyon, the RWP specifies a need for respiratory protection; however, this control was instituted based on the knowledge of high concentrations of radioactivity inside the duct and concern over disturbing the duct during cover installation. It is not evident from the ALARA review or work package that engineering controls were considered to reduce or eliminate this potential (i.e., high-efficiency particulate air downdrafts or alternative cover designs that did not impact the duct). In general, there is no documentation attached to the pre-job ALARA checklist describing the evaluation of each checklist item as it relates to the proposed job.

Similarly for post-job ALARA reviews, methods and controls used are often listed on the post-job form; however, the effectiveness of methods employed and lessons learned is not documented. For one job, a pre-job dose estimate of 10 rem was projected, but the total job was about 200 mrem; the large difference was not explained. In other cases, the post-job ALARA review lists the controls that were used but does not describe their effectiveness. This lack of description degrades the effectiveness of post-job ALARA reviews in providing valuable lessons learned for subsequent ALARA work planning. In addition, radiological work planning and review documentation does not clearly demonstrate whether engineering and administrative controls are being fully and properly evaluated in the work planning processes.

SR has previously identified similar weaknesses in the contractor's radiological engineering support to work planning and has formally transmitted these findings to WSRC for corrective action. WSRC has committed to improve radiological engineering in the Radiological Improvement Strategic Plan. However, the plans for achieving these goals are not sufficiently detailed to provide a clear path forward for incorporating change at the work planning level. In conjunction with the Radiological Improvement Strategic Plan, an initiative was identified to develop sitewide qualification requirements and continuing training for ALARA coordinators; however, little progress has been made.

SR has imposed less-restrictive release limits for fixed transuranic radioactive contamination than specified in DOE guidance.

In the environmental area, the WSRC radiological release requirements for fixed transuranic radioactive concentrations are less restrictive than DOE Headquarters (Office of Environment, Safety and Health) expectations. In a November 1995 memorandum clarifying DOE Order 5400.5 and the draft 10 CFR 835, the Office of Environment, Safety and Health provided expectations for sites to use an average value of 100 dpm/100 cm^2 as the release criteria for total transuranic activity. In contrast, SRS uses a value of 500 dpm/100 cm^2 and has no approved alternative or exemption in place. SR transmitted the DOE Headquarters memorandum to the contractor in early 1996 for review, but without specific SR direction for implementation. Site release criteria for other isotopes and for removable contamination are either more conservative than or consistent with the values established by the Office of Environment, Safety and Health.

In the industrial hygiene/industrial safety area, some safety and health training requirements were inadequately defined and implemented.

In the industrial hygiene/industrial safety area, some safety and health training requirements were inadequately defined and implemented. For example, workers at 234-H were operating a Yale lift truck without the training required by the site safety manual. Work activities involving the use of the lift were suspended until operator training was completed. Furthermore, neither the WCP nor the pre-job briefing form provides a mechanism for documenting or verifying non-radiological training requirements, such as training on scaffolding, forklifts, or electrical safety awareness. Some safety and health facility-level procedures are not current with changes in institutional procedures. For example, tritium facility procedures for operating the Yale lift truck and for the tritium

facilities' respiratory protection program have not been updated since 1996 and 1993, respectively, although there have been significant changes in both programs during the past two years. Facility staff indicated that line supervisors are required to verify training, but these are weaknesses in this method.

Summary

Most elements of hazard control were found to be comprehensive and detailed. Systems to control and communicate operations at F-Canyon and the tritium facilities were formal, comprehensive, and effective. Management, facility, and worker commitment to maintaining facility condition and safety awareness and discipline were evident and industrial safety and radiological housekeeping was excellent. Personnel at all levels were very safety conscious and knowledgeable of the types of hazards present and the importance of implementing effective controls. In general, activity-level hazard controls effectively provide an adequate level of protection against workplace hazards. However, weaknesses were identified. These include inconsistencies in the WCP process, weaknesses in radiological engineering support and documentation of ALARA reviews, and unclear mechanisms for ensuring that all required non-radiological training and procedure is verified prior to performing work.

Perform Work Within Controls

Core Function #4: Readiness is confirmed and work is performed safely.

The work activities that were observed were performed safely.

Safely performing work is the culmination of well defined and properly analyzed work with appropriate controls and supervisory oversight commensurate with the risk of the work activities performed. A rigorous process is necessary to confirm adequate preparation and readiness to begin work before work is authorized at the facility, project, or activity level. The formality of the process, the extent of documentation, and the level of approval should be based on the hazards and complexity of work. At SRS, implementation of programmatic controls discussed under Core Function #3 has generally resulted in disciplined work practices and processes. Overall, the observed work activities were safely performed in accordance with technical procedures or other appropriate work instructions.

Authorization for all work to begin is formally granted.

Readiness for work is formally confirmed for all activities, including project and construction work. At the institutional level, readiness of nuclear facilities is verified by operational readiness reviews and assessments. The WSRC Assessment Manual provides guidelines and requirements for performing contractor readiness assessments and operational readiness reviews of nuclear facilities and activities. The manual is comprehensive; addresses the requirements of DOE Order 425.1A, *Startup and Restart of Nuclear Facilities;* and is well integrated with SR procedures and requirements. At the activity level, signature authorization for work to begin is formally granted by the shift operations manager or area manager by his or her signature on the appropriate work control document, such as a WCP or technical procedure prerequisite.

The presence of WSRC management in the workplace is evident, and their awareness of safety and work activities is good.

The presence of WSRC management in the workplace is evident, and their awareness of safety and work activities is good. Most work that was observed was performed professionally and in accordance with applicable controls and procedures. The work shifts began with project briefings, safety meetings, and comprehensive shift turnovers. Shift turnovers were formal and efficient, with dedicated rooms for turnover meetings. The shift operations manager led the turnover meetings, which were attended by senior facility management and by other work groups, such as maintenance and radiological controls. Shift personnel in F-Canyon sat in designated positions and individually addressed previous shift activities, current facility conditions, and planned shift activities within their areas.

The operators were knowledgeable of the systems and demonstrated pride in the facility.

Emerging and routine operations and maintenance work activities are generally performed formally, effectively, and in accordance with appropriate procedures and permits. For example, the F-Canyon operators performed rounds, recorded logsheet readings, and operated equipment such as the High Activity Waste and Lab Waste evaporators in accordance with applicable procedures, RWPs, and the site Conduct of Operations Manual. The operators were knowledgeable of the systems and demonstrated pride in the facility. Communications were appropriate, and documentation was properly completed. Following a spurious high-activity alarm in the F-Canyon circulated cooling water system, the operators correctly identified the alarm and entered the appropriate emergency operating procedure. The operating crew demonstrated good teamwork and problem-solving techniques to address the alarm.

Other site support service and subcontractor personnel demonstrated professional work practices. For example, the Demonstration Test Facility construction site was neat and clean, the excavation and shoring were proper, and all required safety barriers were in place. The work package addressed the appropriate technical job steps and hazards, and the construction project manager, superintendent, and foreman were knowledgeable of the details of the job. As another example, the Central Shops sheet-metal shop was orderly, and the fabrication of ductwork was in accordance with drawings (e.g., correct material, bolt spacing, and weld sizes).

Most work is conducted safely, but deficiencies indicate that continued improvement is needed.

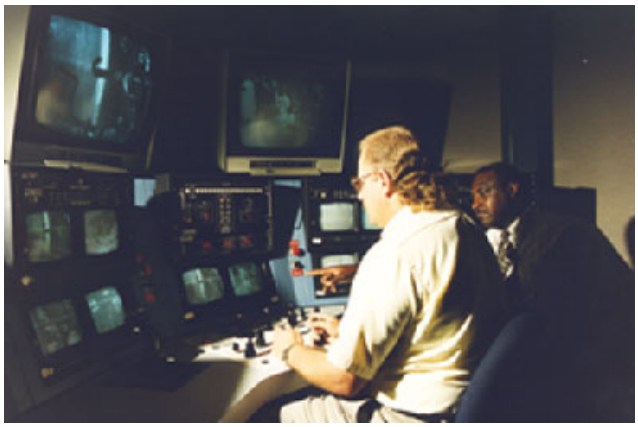
Most work is performed safely. However, some observed activities were not conducted in accordance with procedures. For example:

- A Radiological Control Technician took a smear in close proximity to a 120-volt terminal. Although "anti-c" gloves afforded some protection, the activity conflicts with the site requirement that workers without proper personal protective equipment and training must stay at least three feet away from bare 120-volt electrical conductors.

- In preparation for a line break in F-Canyon, a radiological control technician inappropriately positioned the required air-sampler at too great of a distance, approximately 20 feet away from the work area.

- At 234-H, radiological control technicians utilized an air monitor with inadequate sensitivity for removing postings for an airborne radioactivity area. This practice was not in accordance with site procedures.

- Occupational Safety and Health Administration and site requirements were not properly implemented in a few cases, such as proper tie-offs of ladders and establishing required excavation safety boundaries.



Operator and Supervisor in F-Canyon Control Room

Other deficiencies in work performance were observed. At the tritium facilities, workers improperly disposed of excess clean plastic in a radioactive waste container. The plastic overflowed the radioactive waste box and was in direct contact with furnishings in a non-contaminated area. In F-Canyon, personnel demonstrated inadequate knowledge of electrical relays and diesel generator fault mechanisms. The output breaker of a standby diesel generator failed to trip following a manual diesel shutdown, although protective relays actuated. The operator and an engineer did not recognize the output breaker fault and assumed that the diesel was still running for an unknown reason. Consequently, the diesel generator remained connected to the bus (motorized) for approximately three hours while management and engineering were consulted and troubleshooting was

performed. No response procedures and/or training exist for recognition of diesel generator motoring or actions to take when the output breaker fails to open when expected.

Summary

The need to perform work within controls is well understood and accepted at all levels within the organization. The conduct of operations is rigorous. Most of the work that was observed was appropriately performed in accordance with procedures and specified controls. The Oversight team observed several notable practices, such as excellent housekeeping, formal and effective shift turnover, and extensive WSRC management involvement in work activities. A few work performance deficiencies indicate that continued management attention is needed to ensure that work is safely performed within appropriate controls.

Performance Feedback and Continuous Improvement

Core Function #5: Feedback information on the adequacy of controls is gathered, opportunities for improving the definition and planning of work are identified and implemented, line and independent oversight is conducted, and, if necessary, regulatory enforcement actions occur.

The concept of continuous improvement requires that line management establish formalized mechanisms and processes for identifying and documenting ES&H-related deficiencies and for tracking corrective actions. To ensure that corrective actions are timely, complete, and effective, a firm technical basis and the responsibility for timely implementation must be clearly identified. To avoid recurrence of deficiencies, line management must establish a process for disseminating lessons learned to affected personnel. SR has developed programs to evaluate WSRC progress in achieving DOE expectations, although some of these programs are not fully effective in supporting rigorous line oversight of WSRC. WSRC self-assessment programs are mature, effective, and support continuous improvement. The WSRC initiatives are complimented by strong sitewide corrective action and lessons-learned programs that facilitate effective resolution of issues.

SR Oversight

SR line management oversight is achieved through the SR technical assessment program, the Facility Representative program, and other focused assessments such as accident investigations. SR implementing procedures, manuals, and other program-specific documents delineate the mechanisms and requirements for executing these programs. Although SR has developed programs to evaluate WSRC progress in achieving DOE expectations, some of these programs are not fully effective in supporting rigorous line oversight of WSRC.

Improvement is needed in implementation of the SR technical assessment program.

Assistant managers and office directors develop Annual Assessment Plans for each of 20 functional areas, such as maintenance, that correspond to the S/RID, and assessment activities are conducted in accordance with technical assessment guidelines developed by responsible individuals at the program and facility levels. Although the technical assessment program provides good direction, there are inconsistencies in its implementation. For example, technical assessment guidelines have not been prepared by many organizations, and some important functional areas, such as WSRC's implementation of maintenance at F-Canyon, have not had a focused assessment in several years.

Facility Representatives are actively engaged in safety oversight of the contractor.

The Facility Representative program is effective in identifying contractor performance deficiencies and communicating them to the contractor for resolution. Facility Representative assessment activities are assigned on a monthly schedule from the annual facility assessment plan, which is integrated with the sitewide technical assessment plan; the assessments contain definitive assessment criteria. At F-Canyon and the tritium facilities, Facility Representatives are at the baseline staffing levels of four and three personnel, respectively. Facility Representatives are either fully qualified or are actively pursuing full qualification. The fact that the SR Manager performs a final qualification walk-through with qualifying Facility Representatives is noteworthy in that it highlights the importance that SR senior management places on the

Facility Representative program. The communication mechanisms used to notify the contractor of assessment findings are reflected in the six-month award fee determination.

Some aspects of the Facility Representative program require improvement.

Some aspects of the Facility Representative program require attention. Although the Facility Representatives are required to perform 10 percent of their assessments during backshifts, during a recent six-month period only 2 percent of the assessments in F-Canyon were documented as having been performed during a backshift. Backshift assessments at the tritium facilities are also fewer than required. Some Facility Representative deficiencies at F-Canyon have not been processed in a timely manner. For example, a 1996 issue involving nitric acid being delivered by workers lacking appropriate personnel protective equipment is still unresolved. In the tritium facilities, Facility Representatives do not track concerns in an SR database. Instead, they maintain a running tabulation as a part of their "formal" weekly report, which is prepared for meetings with the contractor; if a concern remains open for more than a few weeks, it is entered into the WSRC Commitment Tracking System until closure.

Finally, although SR has implemented methods for tracking identified ES&H deficiencies, they have not implemented a sitewide process for assessing, trending, and evaluating WSRC performance and success in resolving identified deficiencies. Consequently, SR's ability to perform its oversight role as defined in the Functions, Responsibilities, and Authorities Manual in a timely manner is limited.

WSRC Assessment Program

WSRC has developed and implemented an effective independent assessment and oversight program for operational facilities.

WSRC has developed and implemented a comprehensive independent assessment and oversight program for operational facilities that includes independent FEB assessments and line management self-assessments. Formal assessment performance objectives and criteria, derived from requirements such as those identified in the S/RID, have been developed. Assessment criteria are divided into functional areas, such as design, maintenance, conduct of operations, and occupational safety and health, to aid in developing specific measurement standards.

The FEB periodically performs independent performance-based assessments of WSRC operational facilities and evaluates site-level programs, facilities, and activities for which ES&H, radiological control, or quality assurance oversight is required. The FEB completed its first unannounced evaluation of F-Canyon on November 6, 1998. The evaluation was comprehensive, well documented, and effective in identifying strengths, weaknesses, and areas for improvement. The Oversight team noted significant improvement by SRS in correcting FEB-identified deficiencies. For example, repeated housekeeping and material condition problems were identified as an issue where the root cause had not been identified and corrected. Housekeeping and material condition were excellent during the oversight evaluation.

WSRC self-assessment and corrective action programs at the tritium facilities are mature and comprehensive.

The self-assessment program at the tritium facilities is mature, comprehensive, and sophisticated. The Tritium Facilities Self-Assessment Plan focuses on each of 23 assessment functional areas, including project management. Line managers, from field supervisors through senior managers, observe work evolutions at frequencies determined by management (usually four per month). After review, all results are entered into a database, quantitatively rated, and correlated to ISMS core functions. Root causes are identified and findings are entered in the Commitment Action Tracking System. If the observed evolutions and results of other assessments fail to provide opportunities to assess required criteria or if periodic reports of assessment trends indicate a problem, self-assessment "cards" are issued to trigger a more in-depth examination of a program. To improve the self-assessment process, the tritium facilities use coaching teams composed of Defense Program Managers to observe evolutions. An internal FEB performs management evaluations and conducts quarterly meetings to develop core issues, to review the output

of the self-assessment program, and to assess the status of the corrective action program.

The F-Canyon self-assessment program continues to mature as lessons learned are implemented.

The F-Canyon self-assessment program continues to mature as lessons learned are implemented. The Facility Manager is the "assessment unit manager" responsible for establishing the self-assessment plan and for ensuring that assessments are performed. Based partly on an adverse FEB finding in January 1999, the Facility Manager directed F-Canyon senior managers to perform one assessment per month. Including recently added assessment topics such as JHAs and crane operations, assessments total approximately 40 per month. As with tritium facility assessments, results are reviewed with the assessor's supervisor for adequacy.

WSRC Issue and Corrective Action Management Program

The tritium facilities' corrective action management program is effective. Deficient conditions from several sources, such as self-assessment and FEB findings, are prioritized and entered in the Commitment Action Tracking System. The findings are tracked and trended with several performance indicators, and analyzed for cause. Approximately 1,300 items have been entered into the Commitment Action Tracking System database since January 1, 1999, with priorities determined by due date. Less than one percent of entries are past due.

Recent attention has appropriately reduced the total open and overdue corrective actions from about 30 percent on July 2, 1999, to 4 percent on July 27, 1999. Review of the NMS&S Self-Assessment DeskTop Instruction indicated some inconsistencies between the instruction and program implementation. Management and supervisors must continue to focus observations on people, performance, and activities in addition to housekeeping issues.

Continuous Improvement and Lessons Learned

WSRC's effectiveness in achieving continued performance improvements is evident in several areas. Performance indicators and other feedback mechanisms are effective in improving the F-Canyon and the tritium facilities maintenance organizations. For example, as a result of tracking and analyzing the causes for work delays at F-Canyon, the effectiveness of the work scheduling process has been improved by identifying, at the Plan-of-the-Day meeting, the names of the support personnel required for work activity completion. At the tritium facilities, an analysis of measuring and test equipment calibration frequencies has significantly reduced the number of preventive maintenance tasks that must be performed.

During the F-Canyon exhaust upgrade, numerous lessons learned were factored into the same work at H-Canyon.

For work activities, weekly critiques are conducted by the Work Management Center work window managers at the tritium facilities and F-Canyon to analyze the past week's work activities for strengths and weaknesses and to discuss performance indicators. As a result of these critiques, the need for additional post-job reviews and associated lessons learned are identified and informally transmitted to cognizant personnel to improve work processes. For example, during the F-Canyon exhaust upgrade, numerous lessons learned from erection of the F-Canyon diesel generator building were factored into the same work package for H-Canyon. However, there is no formal guidance for either the conduct of the weekly critiques or post-job reviews. This lack of guidance limits the ability to perform consistent work process critiques that meet management expectations.

Facility managers have implemented several management initiatives to foster continuous

Diesel Generator Building

improvement. For example, at F-Canyon, at the end of each four-day watch cycle, the shift operations managers moderate a meeting with their respective shift crews to discuss issues, concerns, and lessons learned from shift operations. Another example is the designation of a specially trained member of the shift as the "Safety Observer," who records observations relating to safety for activities performed during the shift. However, because some observations are not accompanied by an appropriate closure action, shift management cannot ensure that corrective actions are taken if the observer fails to initiate action.

WSRC is implementing behavior-based training programs. The program is mature for the Construction Department and has been recently initiated for the balance of the site. This program is a "blameless" peer review program designed to improve safety performance.

The WSRC lessons-learned program reviews a broad array of operating experiences to apply the lessons to SRS operations.

The site lessons-learned program systematically reviews operating experiences at SRS, other DOE sites, the commercial nuclear industry, and other industry sources to apply the lessons to SRS operations. A wide range of input information has been reviewed, categorized for significance, and disseminated to facility lessons-learned coordinators for action within the facilities. As an example, a notice was distributed at the beginning of the year concerning potential corrosion in fiberglass-wrapped, aluminum, self-contained breathing apparatus cylinders. The site coordinator appropriately distributed the information to facilities. The corrective action taken, results, and person responsible were readily found in the tritium facilities' Commitment Action Tracking System. However, the required action had not been closed for all NMS&S facilities. For F-Canyon, the required inspection was promptly performed, but it was not documented and had to be performed again.

Lessons learned from violation of electrical safety requirements by a radiological control technician during the Oversight evaluation were promptly disseminated within F-Canyon and to the site (see Core Function #3). Each shift had a short stand-down to discuss the event, as required by the shift orders. In addition, the F-Canyon radiological control manager disseminated a writeup of the initial lessons learned to all other SRS radiological control managers for discussion with employees. The critique of the electrical incident actively involved all affected parties, was performed in a structured manner consistent with the site Conduct of Operations Manual, and ultimately resulted in an event report due to management interest. The operating experience review program at the tritium facilities appropriately captures internal problems for dissemination to the organization and includes traceability, due dates, target audience, and method of delivery.

Summary

SR has established comprehensive assessment programs. The Facility Representative program provides good facility coverage with qualified personnel to effectively oversee contractor operations. Other SR-required assessment mechanisms are not fully implemented in all line organizations. Management attention is required to ensure that line oversight activities are performed in accordance with programmatic requirements.

The WSRC assessment process is generally well implemented. The oversight role performed by the FEB has caused significant improvement in management attention to facility operations. Facility Managers are actively engaged in day-to-day activities, including work performance and assessment of the adequacy of policies implemented through lessons learned. Facility performance indicators are used effectively to permit monitoring of selected activities and detect adverse trends. Although the post-job review process was noted to have enhanced follow-on work activities, the process has not been formalized.

The site lessons-learned program is well developed and, together with effective facility commitment tracking systems, ensures that operating experiences from SRS and industry are incorporated into similar activities within the SRS facilities.

Ratings

Figure 3 presents the ratings for the five core functions.

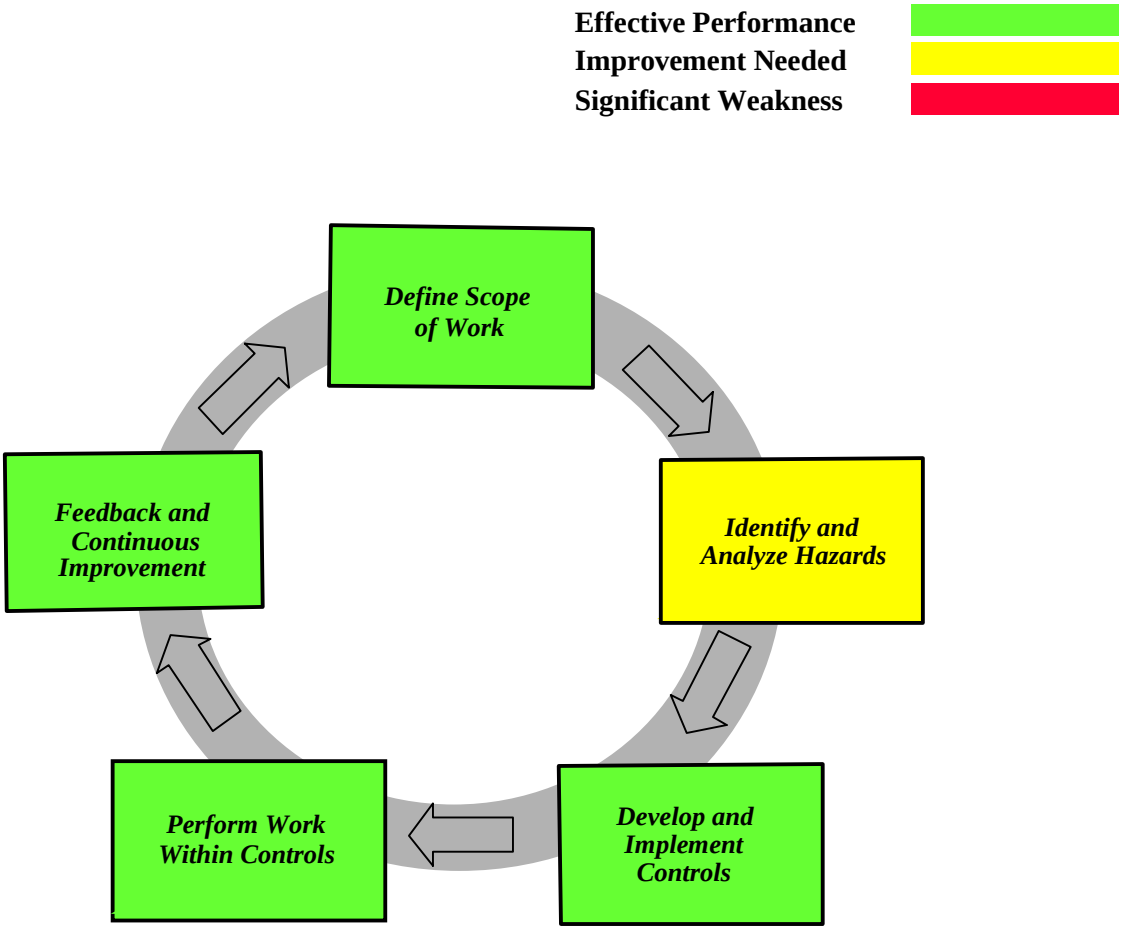


Figure 3. Core Function Ratings for SRS

3.0 OPPORTUNITIES FOR IMPROVEMENT

The focused review conducted by the Office of Oversight identified several opportunities for improvement that are intended to assist line management in identifying options, potential solutions, and potential enhancements to their programs. The responsible DOE and contractor line managers should review and evaluate the opportunities for improvement enumerated below, as well as the specific suggested actions listed under each item. However, these suggestions are not intended to limit the initiative and good judgment of line managers. Line management is ultimately responsible for safety and should use their experience and judgment in developing corrective actions, in accordance with site-specific programmatic and ES&H objectives. While the opportunities for improvement in this section may provide line management with insights about potential corrective actions, the site may identify other mechanisms for addressing identified issues.

1. Strengthen SR oversight of WSRC.

- Revise the technical assessment program to adjust the scope consistent with the technical needs and available resources. Require the personal involvement of senior managers, at the assistant manager level or above, to set assessment priorities based on WSRC performance to assure effective use of available resources.

- Revise the management walk-through process to require documentation, tracking, and distribution of observations and findings to senior management. Specify the number or frequency of walk-throughs to be performed by individuals who are managers, and provide periodic reports to the SR Manager on the status of walk-throughs.

- Improve manager and staff accountability for oversight program implementation through monitoring and the performance appraisal process.

- Consolidate WSRC performance data, including Facility Representative and technical assessment program findings, in a common system to facilitate sitewide assessment of contractor performance.

2. Enhance WSRC processes for work planning and control.

- Improve the effectiveness of hazard analysis processes by:

1. Establishing JHA/WCP thresholds based on the type and risk of work activities that would invoke a formal JHA to supplement the work clearance permit

2. Streamlining the JHA process such that accurate, graded JHAs can be prepared in a timely manner for a range of tasks to support work activities

3. Considering standard JHAs for repetitive tasks.

- As part of the work planning process, establish a mechanism (e.g., WCP and pre-job briefing checklist) to formally verify that workers have both the required and specialized training for job assignments, and ensure that required training is conducted and is current.

- Improve processes (e.g., verifications and excavation checklists) to ensure that adequate worker protection measures, such as safety barriers, are installed before authorizing work and that the required barriers remain in place. Verify that the workforce understands workplace safety requirements.

- Formalize the process for conducting and documenting the weekly work performance critique and post-job reviews with worker

and first-line supervisor involvement to gain maximum benefit from experience gained during work activities. Establish criteria or thresholds for performing post-job critiques.

- At F-Canyon, provide additional training on abnormal diesel generator operations, including indications of diesel generator motoring, purpose and function, and protective relay operation. Develop and train operators on alarm response procedures for local alarm panels at diesel generators.

- Consider developing an automated application for the facility BHA (workplace baseline hazard assessment, DOE Order 440.1A) to facilitate its access and use by work planners, safety professionals, and line management in preparation for work activities.

3. Increase the effectiveness of WSRC safety professionals.

- Establish a qualification program for industrial hygiene/industrial safety professionals consistent with the qualifications for national professional industrial hygiene/industrial safety organizations. For industrial hygiene technicians, revise the qualification program consistent with the national Occupational Health and Safety technical program.

- Define expectations for the involvement of radiological engineers in job planning and ALARA reviews. Revise the Radiological Improvement Strategic Plan to more specifically define the actions to be taken and scheduled completion dates. Establish training and qualification requirements for radiological engineers and other radiological professionals.

APPENDIX A
ISSUES FOR CORRECTIVE ACTION AND FOLLOW-UP

Line management is responsible for correcting deficiencies and addressing weaknesses identified by the Office of Oversight reviews. Following each review, line management prepares a corrective action plan. The Office of Oversight follows up on significant issues as part of a multifaceted follow-up program that involves follow-up reviews, site profile updates, and tracking of individual issues.

This appendix summarizes the significant issues identified in this report of the focused review of SRS. The issues identified in Table A-1 will be formally tracked in accordance with the DOE plan developed in response to Defense Nuclear Facilities Safety Board Recommendation 98-1, which addressed follow-up of independent oversight findings. SR and WSRC need to specifically address these issues in the corrective action plan.

During a focused review, the Office of Oversight team may identify isolated weaknesses and/or minor deficiencies in otherwise effective programs. Although the site needs to correct such weaknesses and deficiencies, the Office of Oversight does not include every identified weakness in the formal tracking system. However, all weaknesses and deficiencies are considered as part of the Office of Oversight follow-up program when evaluating safety management performance and planning future Oversight evaluation and follow-up activities.

Table A-2 provides the status of legacy issues identified during the 1996 Office of Oversight safety management evaluation. The major SRS corrective actions (reported in a memorandum from SRS to the Assistant Secretary of Environmental Management, dated July 1, 1999) are summarized followed by the status of these issues as determined by the Office of Oversight. In cases where a majority of the corrective actions are complete but some deficiencies remain, new issues, of a more restricted scope, were identified.

Table A-1. Issues Identified in Focused Review

IDENTIFIER	ISSUE STATEMENT	REFER TO PAGES
SRS-FR-99-01	The implementation of SR contractor oversight programs is not fully effective and lacks systematic application. Deficiencies were identified in implementation of the technical assessment program, inadequate documentation of management walk-throughs, and inadequate self-assessments of the SR line oversight program.	10
SRS-FR-99-02	The mission date of stabilization activities has been extended past 2006 without re-evaluating the need to upgrade the NMS&S BIOs to DOE Order 5480.23 SARs. Approval of the current NMS&S BIOs was based on the mission ending in 2002.	10-11
SRS-FR-99-03	Multiple deficiencies were identified in the implementation of WSRC hazard analysis processes. Examples include: deficiencies in industrial hygiene/industrial safety training, staffing, involvement in work activities, and procedure reviews; weaknesses in radiological engineering support for the work activities and in pre- and post-job ALARA reviews; and a lack of integration and linkage between various hazard analysis elements (e.g., WCPs, JHAs, PHAs, and safety plans).	16-17

Table A-2. Legacy Issue Status

IDENTIFIER	ISSUE STATEMENT
SRS-01/01/1996-0001-I	SR and WSRC have not allocated the necessary resources to meet a commitment to upgrade the authorization basis for all facilities to DOE Order 5480.23 standards within five years. Additionally, a number of administrative, procedural, and technical problems were evident in the authorization basis and current safety documentation, particularly in the integration of hazard evaluations and the USQD process. SRS reported completion of several actions to address this issue. S/RIDs were revised to require development and maintenance of safety document implementation plans, including target dates and schedules. A Safety Document Integrated Implementation Plan (November 1998) was developed with date and schedule changes controlled through the Annual Operating Plan and Baseline Change Proposal processes. A joint SR–WSRC Authorization Basis Steering Committee was established to review the process and performance of SRS in improving facility authorization bases. The Facility Safety Manual was revised to require that worker safety be analyzed and included in safety documents, and the Integrated Work Process Manual was revised to provide an integrated process for development and maintenance of safety documents. Guidance for consistently implementing the USQD process across the site was developed by the steering committee and included in the Facility Safety Manual. The Oversight evaluation determined that there have been improvements in program requirements and implementation of authorization bases requirements and the USQD process. A consolidated tritium facility SAR to envelop all tritium facilities is planned for issuance in October 1999. A limited sampling of SARs and BIOs at the tritium facilities and F-Canyon indicates that facility-level safety documents adequately describe the facility hazards and are properly maintained. Project and facility work packages are properly screened and evaluated using the USQD process. A limited review of safety analysis documents for the americium-curium project and depleted uranium-plutonium project indicates that worker safety was considered. Oversight will monitor the continued implementation of initiatives to address this issue. Based on a stabilization mission of about 2002, a cost-benefit decision elected not to upgrade the NMS&S BIOs to DOE Order 5480.23 compliant SARs. The approval indicated that a new evaluation should be performed if mission dates were extended. In light of present stabilization mission dates that extend past 2006, an updated evaluation is needed. **This is identified as a new issue, SRS-FR-99-02.**
SRS-01/01/1996-0002-I	SR and WSRC have not provided the necessary leadership to prevent recurring deficiencies in some facilities and programs. Significant weaknesses in implementation of requirements and work practices were evident in radiation control, waste management, industrial hygiene, work planning, maintenance work control, and conduct of operations (particularly lockout/tagout). SRS reported completion of several actions to address this issue. SR established the Executive Technical Management Board composed of assistant managers and subject matter experts to review projects and operational activities sitewide. The WSRC ISM Executive Steering Committee composed of Vice Presidents performs similar reviews for WSRC. SRS improved the self-assessment and management evaluation procedures to minimize recurrence of deficiencies. Management Policy, MP-5.35, Corrective Action Program, was developed and implemented using a graded approach to direct root cause analysis and corrective action for recurring deficiencies. The assistant manager for Health, Safety, and Technical Support integrated feedback from technical assessment and other evaluations into monthly performance

Table A-2. Legacy Issue Status (Continued)

IDENTIFIER	ISSUE STATEMENT
SRS-01/01/-1996-0002-I (Con't)	meetings. SR initiated a monthly "Conduct of Operations Report" (June 1999) that includes an SR overall analysis, contractor analysis, performance, and trends. SR and WSRC senior management met to discuss and evaluate actions to improve performance. WSRC hazardous energy control and work clearance and authorization procedures were revised to improve the process for controlling work. The Oversight evaluation of F-Canyon, the tritium facilities, and selected projects indicated significant improvement in SR and WSRC leadership, WSRC programs and procedures that control work, and implementation of controls for projects, facilities, and work activities. SR has clearly communicated expectations to WSRC and has accountability mechanisms in place to measure performance. A range of corrective actions from this issue and related issues have greatly improved programmatic processes and accountability to ensure that required controls are correctly implemented at the working level. Notwithstanding the significant program and implementation improvements, some deficiencies were identified in: industrial hygiene/industrial safety training, staffing, involvement of safety professionals in work activities; radiological engineering support for the work activities and in pre- and post-job ALARA reviews; and integration and linkage between various hazard analysis elements (e.g., WCPs, JHAs, PHAs, and safety plans). **These weaknesses are identified as a new issue, SRS-FR-99-03**. Oversight concludes that there has been substantial progress in the majority of actions to address the more significant SRS work control issues. Remaining actions are of a lesser nature. However, additional action is required to fully address this issue. Therefore, a new issue was identified to track those areas. Oversight will continue to monitor implementation progress.
SRS-01/01/1996-0003-I	SR and WSRC have not effectively used information available from the various deficiency and corrective action tracking systems to develop comprehensive solutions to recurring sitewide deficiencies. Weaknesses exist in identifying and addressing root causes, developing corrective actions to address complex problems, and managing issues. SRS reported completion of several actions to address this issue. An expanded root cause methodology was developed to provide analysis beyond a symptomatic level to the programmatic or system levels. Translation tables between the symptomatic root cause tree and programmatic criteria were updated, and a Problem Analysis Manual that defines the graded approach for root cause analysis was developed and issued. A new policy, MP 5.35, Corrective Action Policy, was developed and implemented. SR and WSRC took action in 1998 to improve the timeliness of occurrence reports resulting in faster root cause identification. The conduct of operations performance indicator is linked to occurrence reports in categories related to disciplined operations. SR review of disciplined operations has been enhanced by including more detailed evaluation by category and facility. The Oversight evaluation found that DOE line organizations have implemented methods for tracking identified deficiencies that vary from computerized databases within F-Canyon to utilization of the contractor Commitment Action Tracking System within the tritium facilities.

Table A-2. Legacy Issue Status (Continued)

IDENTIFIER	ISSUE STATEMENT
SRS-01/01/1996-0003-I (Con't)	Regardless of the method employed, assistant managers were well aware of the current issues affecting their facilities and evaluating corrective actions implemented by the contractor. However, SR has not implemented a process for assessing, tracking, trending, and evaluating sitewide contractor performance and success in resolving identified deficiencies. Oversight confirmed that WSRC has started the implementation of MP 5.35, Corrective Action Policy, together with its supporting document, SCD-9, Problem Analysis Manual. These corrective actions were completed in April 1999, thus, the effective implementation of an adequate program to identify and address root causes was not evaluated. WSRC has implemented effective corrective action tracking systems in the F-Canyon and the tritium facilities, together with several performance indicators to enhance early identification of facility-specific problems. Oversight concludes that there has been progress in addressing elements of this issue, but some actions are recent. Therefore, the effectiveness of all actions and their implementation could not be evaluated. The evaluation identified additional specific SR oversight deficiencies related to, but not necessarily included in, the legacy issue above. Deficiencies were identified in areas such as: performing all required SR assessments, SR self-assessment program, management walkdowns, and tracking and documentation of deficiencies. **These deficiencies are identified as a new issue, SRS-FR-99-01.**
SRS-01/01/1996-0004-I	SR has not clearly defined a comprehensive process for implementing privatization initiatives at SRS that fully consider applicable ES&H policies and provide for regulation and oversight of worker safety; this has created a vulnerability for the Department. SRS reported that the SR policy statement, "SR Privatization Program," and SR implementing procedure 500, Chapter 580.2, "SR Privatization Program" were issued. The procedure outlines the evaluation method for reviewing potential privatization projects. SR reported that appendices provide in-depth checklists for ES&H areas and that questionnaires query past ES&H performance of potential firms. The D-Area Powerhouse and Three Rivers Landfill are privatized with safety and health oversight being the responsibility of the federal Occupational Safety and Health Administration. The focused Oversight evaluation did not evaluate this issue.
SRS-01/01/1996-0005-I	SR and WSRC have not implemented an effective process for oversight of subcontracted work. WSRC failed to ensure that a subcontractor identified and implemented the proper radiation protection requirements for a large subcontracted project, and both SR and WSRC oversight of the subcontract was limited and inconsistent with the hazardous nature of the project. SRS reported completion of event-specific and generic actions to address this issue. The involved subcontractor issued a lessons-learned document on the incident. The facility characterization plan was revised to include the correct release limit. SRS issued the final event report for the event (SR-WRSC-ERF-1995-0011). The prime contract was revised to require subcontractors to maintain a graded worker protection program acceptable to WSRC and compatible with ISMS. The SRS Workplace Safety and Health Policy was approved, bringing all site workers under a consistent safety and health policy. A joint SR–WSRC team developed "SRS Workplace Safety and Health Implementation Guidelines for Contracted

Table A-2. Legacy Issue Status (Continued)

IDENTIFIER	ISSUE STATEMENT
SRS-01/01/1996-0005-I (Con't)	Services." The guidance provides contract language and direction concerning the rigor and documentation that should be applied to oversight of subcontractor safety programs. The Oversight evaluation found that, based on limited observation, control of subcontractors has improved. Strengths include prequalification, "all or none" fee incentive awards, verification of subcontractor safety officer qualification, and institution of SRS technical representatives that provide 100 percent safety oversight of all non-low-risk work activities. Subcontract language includes appropriate regulatory and site requirements. Subcontractors are required to prepare safety plans and appropriate hazard analyses. Observations from work conducted at the storm water upgrade project, canyon exhaust upgrade project, and demonstration test facility site preparation project indicated excellent control of construction work with one exception discussed below. Construction sites had appropriate barriers, work was closely supervised, work packages were being used, and superintendents and foremen were knowledgeable of the work and familiar with the core functions and integrated safety management. The Oversight evaluation identified one deficient PHA and a safety barrier deficiency with one subcontractor on the storm water upgrade project at H-Canyon. The PHA was generic rather than job-specific and was not formatted such that the hazards and controls could be easily related back to a specific job step or activity. Site review of the PHA did not identify the deficiency. Observation of work activities for the same job identified the lack of an adequate safety barrier for a 15-foot-deep excavation. Further review indicated that fall protection for deeper excavations was not adequately addressed by the site excavation procedure. The Construction Department immediately corrected the barrier, conducted a safety stand-down for construction superintendents, issued a bulletin, and initiated a procedure change request for the excavation procedure. Oversight concludes that appropriate actions have been taken to address this issue. Continued emphasis on isolated cases of non-compliance is needed to reduce potential for events. Oversight will continue to monitor subcontractor control at SRS.
SRS-01/01/1996-0006-I	More aggressive action and a higher level of attention is warranted by SR and WSRC to address longstanding life safety code violations in the canyon facilities, particularly HB-line. Compensatory actions have not been fully effective in controlling the presence of combustible materials. SRS reported that actions to address this issue are in progress, but are not yet completed. SRS developed a facility fire inspection program in Procedure Manual S-1, Procedure OP 1.2.1. Numerous life safety code physical improvements are ongoing in canyon areas under projects S-4580 and S-4687. Work to add sprinkler systems to F-Canyon and HB-Line under project S-4610 is projected to be complete in April 2000. These improvements were not within the scope of this focused Oversight review. Evaluators noted that work was in progress in F-Canyon to install fire protection lines. Oversight concludes that actions were in progress, but not yet complete to fully address this issue.

Table A-2. Legacy Issue Status (Continued)

IDENTIFIER	ISSUE STATEMENT
SRS- 01/01/1996 0007-I	Fragmented requirements and program compartmentalization are hampering an integrated approach by WSRC at Savannah River Technology Center to work activities with ES&H considerations. SRS reported that all actions were complete to address this issue. A Conduct of Research and Development Manual was developed and issued. A memorandum of understanding for the Laboratory Technical Operations Area was developed and approved. The memorandum of understanding defines the organizational interfaces and mutual accountabilities between the divisions that perform work within the Laboratory Technical Area. SRS also reported completion of fundamentals training for the full complement of facility operators. The focused Oversight evaluation did not evaluate this issue.

APPENDIX B
EVALUATION PROCESS AND TEAM COMPOSITION

The evaluation was conducted according to formal protocols and procedures, including an Appraisal Process Guide, which provides the general procedures used by the Office of Oversight program for conducting inspections and reviews, and the focused review plan, which outlines the scope and conduct of the review process. Planning sessions were conducted to ensure that all team members were informed of the review objectives, procedures, and methods. The planning process considered previously identified weaknesses, current SRS activities, and SR and WSRC management initiatives. The evaluation team collected data through interviews, document reviews, walkdowns, observation of activities, and performance testing. Interviews were conducted with SR, and contractor managers, technical staff, and hourly workers.

The Oversight evaluation and report provides an assessment of line management implementation of ISM as well as an examination of the five core functions of the ISM program, which are essential to effective work planning:

1. Define Work
2. Analyze Hazards
3. Develop and Implement Controls
4. Perform Work Within Controls
5. Feedback and Continuous Improvement

Team Composition

The team membership, composition, and responsibilities are as follows:

Deputy Assistant Secretary for Oversight

S. David Stadler (Acting)

Associate Deputy Assistant Secretary for Oversight

Ray Hardwick – Operations (Acting)
Neal Goldenberg – Technical

Director, Office of ES&H Evaluations

Patricia Worthington (Acting)
Tom Staker, Deputy (Acting)

Team Leader

William Eckroade

ISM Implementation

Al Gibson

Core Functions

Mark Good
Jim Lockridge
David Schultz
Steve Simonson
Ed Stafford
Mario Vigliani
Tony Weadock

Administrative Support

Bob McCallum
Lee Roginski
Michelle Stover
Marcia Taylor

Quality Review Board

S. David Stadler
Raymond Hardwick
Patricia Worthington
Tom Davis